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## SCIENTIFIC EDITORIAL

# Practical management of heart failure with preserved ejection fraction. A modest proposal

Prise en charge des patients en insuffisance cardiaque à fraction d'éjection préservée : une proposition pratique

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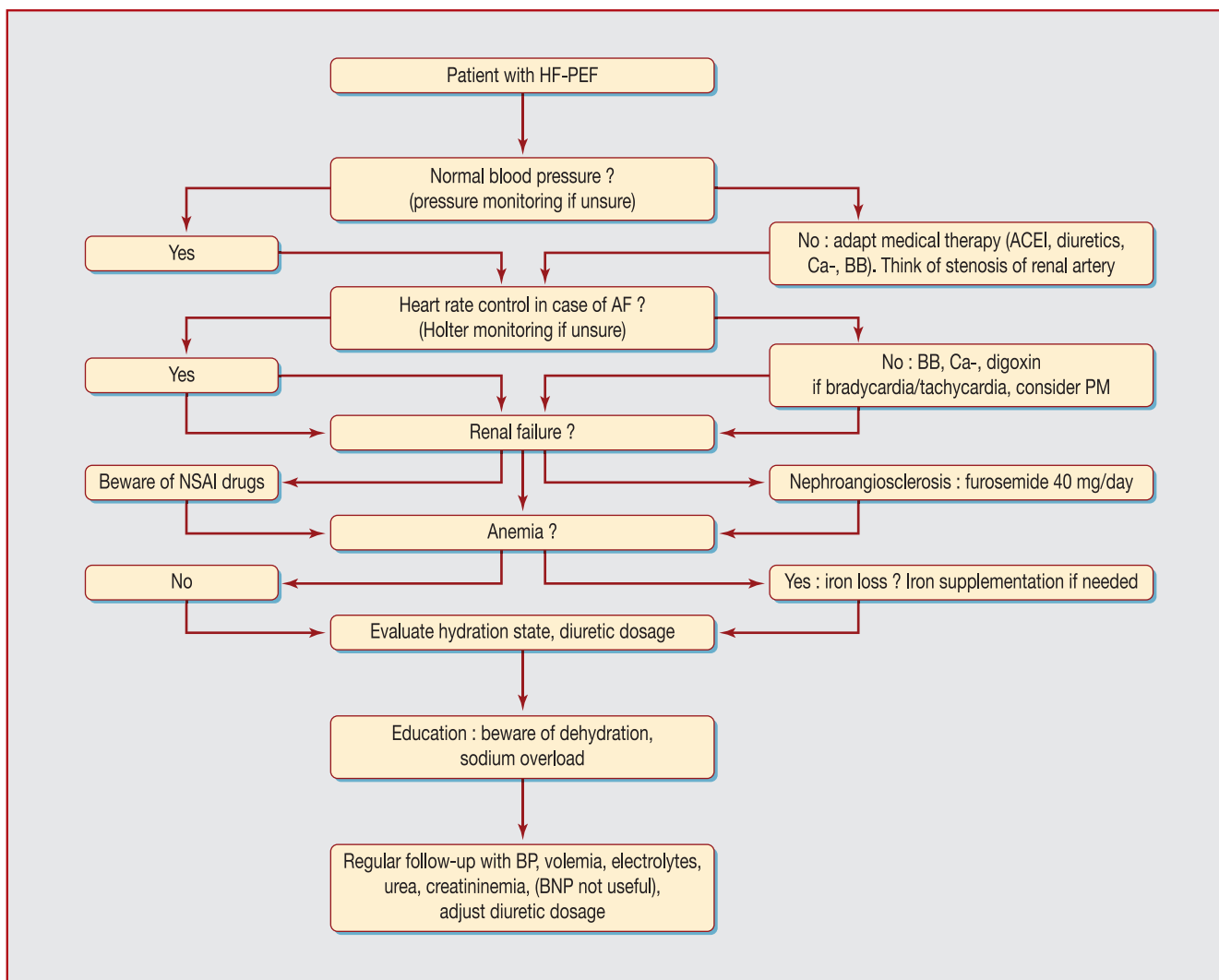
### MOTS CLÉS

Insuffisance  
cardiaque ;  
Insuffisance cardiaque  
aiguë ;  
Traitement

While the management of patients with cardiac insufficiency with systolic dysfunction is well established [1], that of cardiac insufficiency with preserved ejection fraction is not based on any evidence. This is why – even though this pathology is present in more than 50% of patients with heart failure in clinical practice – only a minimal proportion of the latest European guidelines was devoted to this topic (one-quarter of a page within the 61 pages of recommendations and five of 270 references [1]). It also notably demonstrates the limits of the recommendations as well as the difficulty in writing the present paper, with its own limitations (it is a personal opinion and is therefore debatable).

The treatment philosophy for cardiac insufficiency with preserved systolic function is completely different from that of cardiac insufficiency with altered systolic function: with the latter, you want to block hormonal activation (RAS, sympathetic system); with the former you need to treat/address the causes of rigidity in the arteries and cardiac muscle (e.g. arterial hypertension), treat all comorbidities that could aggravate the symptoms of cardiac insufficiency, such as anaemia and renal insufficiency, and avoid the causes of acute cardiac decompensation (e.g. hypertensive crisis, infections, sodium overload, tachycardic episodes). Finally the treatment consists of maintaining the patient in euolemia (emphasizing the importance of therapeutic education, diuretic treatment as a base if needed, avoiding dehydration, etc.), as outlined in Fig. 1.

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**Figure 1.** Proposed scheme for optimizing therapy in a patient with heart failure and preserved ejection fraction. ACEI: angiotensin converting enzyme inhibitor; AF: atrial fibrillation; BB: beta-blocker; BNP: brain natriuretic peptide; BP: blood pressure; Ca: calcium antagonist; HF-PEF: heart failure with preserved ejection fraction; NSAID: non-steroidal anti-inflammatory agent; PM: pacemaker.

In the absence of a curative treatment for cardiac insufficiency with preserved systolic function, it makes sense to try to prevent its occurrence. However, in order to do so it is important to understand the causes of or factors responsible for this condition. This type of cardiac insufficiency is notably observed in hypertensive patients, diabetic patients, the elderly and in patients with renal insufficiency [2–4]. We are able to treat diabetes and arterial hypertension and to slow the progression to cardiac insufficiency while it is still secondary to arterial hypertension and diabetes [5]. The correct management of these pathologies before cardiac insufficiency occurs is therefore fundamental, although it is equally important after cardiac insufficiency appears in order to limit its progression or allow for a possible recovery (e.g. regression of cardiac muscle hypertrophy after stabilising blood pressure) [6].

The causal role played by arterial hypertension is fundamental: it is a factor in increasing arterial rigidity, cardiac hypertrophy and renal insufficiency. Treating

arterial hypertension, even in the elderly, allows us to limit the appearance of cardiac insufficiency. The Hypertension in the Very Elderly Trial (HYVET) study, for example, demonstrated that the treatment of systolic arterial hypertension of more than 160 mmHg in patients over 80 years of age reduces the risk of cardiac insufficiency by 60% [7].

Even after the development of cardiac insufficiency, the treatment of arterial hypertension remains of utmost importance. This treatment is often challenging to put in place and its effects are difficult to evaluate due to the variability of blood pressure levels seen in such patients: the rigidity of their arteries, the reduction in sensitivity of baroreceptors, and systolic left ventricular function beyond the normal range allow rapid variations in blood pressure depending on both the position (orthostatic hypotension is frequent) and the effort being exerted (it is prudent to measure ambulatory arterial pressure in these patients to check that blood pressure is well controlled). The possibility of stenosis of the renal arteries should be considered

or suspected in cases of persistent hypertension, the treatment of which sometimes results in stabilization of blood pressure, limits the progression of renal insufficiency and avoids the recurrence of pulmonary oedema, often secondary to a rapid increase in pressure (i.e. hypertensive crisis) [8]. The choice of initial treatment for the management of hypertension is often determined by its tolerance [9]: angiotensin-converting enzyme (ACE) inhibitors would be the first option in patients with altered renal function in order not to aggravate the condition; calcium channel blockers to counteract arterial rigidity (though it is still somewhat unrealistic to hope to dilate calcified arteries); beta-blockers to prevent any sudden rises in blood pressure associated with stress; and diuretics to limit or reduce hypervolemia, which is often present due to renal insufficiency or associated nephroangiosclerosis. In practice, our preference would be for ACE inhibitors as a first-line treatment, along with a mild diuretic (thiazide) and a beta-blocker in case of significant blood pressure lability.

### Imagine that the arterial hypertension is controlled

If the patient is in atrial fibrillation – a frequent occurrence in this group of often hypertensive elderly patients – good control of cardiac rhythm must be ensured. Beta-blockers, which are also antihypertensive drugs, should be given as first-line treatment because they control both resting heart rate and heart rate on exertion, which digoxin does not [1]. If either resting heart rate or heart rate on exertion remains high despite high doses of beta-blockers (which is rare), a heart-rate-lowering calcium channel blocker (which also treats arterial hypertension) could also be given, or even digoxin, provided renal function is compatible with its use. Experience shows that controlling cardiac rhythm is not easy to achieve in these patients, who often arrive as emergencies suffering from cardiac decompensation. If there is any doubt, Holter monitoring should be carried out to ensure that the resting heart rate as measured during the consultation accurately reflects heart rate throughout the day.

The problem can be more complex in patients with paroxysmal atrial fibrillation, who may have the beginning of bradycardia or tachycardia syndrome. Then, bradycardia may occur even at a low dose of beta-blockers, insufficient to lower heart rate during an episode of atrial fibrillation. These atrial fibrillation attacks may or may not be felt in the form of palpitations, and are therefore easy to miss if the clinician does not check carefully. The prescription of amiodarone may be justified to avoid such attacks, while remaining aware of the risk of bradycardia (and the risk of hyperthyroidism, which can also cause decompensation in patients with cardiac insufficiency and promote atrial fibrillation). If the episodes of atrial fibrillation are responsible for the cardiac decompensation and satisfactory medical treatment cannot be given, this may lead us to propose a pacemaker, allowing the introduction of a satisfactory anti-tachycardic treatment. Even paroxysmal atrial fibrillation justifies anticoagulant treatment [10].

### Imagine that the heart rate problem is under control

The clinician must ensure that all steps have been taken to improve renal function, including checking for the use of anti-inflammatory treatment, which is sometimes responsible for episodes of cardiac decompensation. In elderly or older individuals, these treatments are sometimes considered indispensable by the patients, and finding an alternative can be very challenging; thus it is often better to leave the decision to the rheumatologist. . . It is sometimes necessary to accept that the patient will not always behave as instructed: certain patients will take these medications irrespective of your instructions, at least from time to time. It is better to be aware of their use to be able to anticipate cardiac decompensation early.

Sometimes the opinion of a nephrologist is useful, when renal function is seriously altered, even if it is often a consequence of hypertensive nephroangiosclerosis and/or diabetic nephropathy for which nothing can be done. This type of renal insufficiency is often accompanied by hypervolemia due to hyper-reninism [11], which necessitates diuretic treatment to avoid repeated episodes of decompensation. Thus in these patients, even in the absence of obvious signs of congestion, we would happily prescribe 40 mg/day of furosemide long-term, certainly in cases of recurrent decompensation. There is a risk of excessive diuretic treatment, which would negatively affect renal function; as this effect is purely functional it would regress upon discontinuation of the treatment. If renal function worsens, reducing the dosage of diuretics, in the absence of any signs of congestion, would be or is justified.

The patient now has normal arterial tension, with no episodes of tachycardia, with diuretic treatment in case of nephroangiosclerosis with renal insufficiency. If this suffices to treat the cardiac insufficiency and the patient does not suffer any episodes of acute heart failure whilst taking the medication, the therapeutic process would end there until the next eventual episode of acute heart failure. Everything must be done to avoid factors favouring decompensation: the role played by pulmonary infections justifies vaccination against influenza; we have already addressed the problem of anti-inflammatory treatment.

Anaemia has a specific role: it is a potential cause of decompensation, which must be carefully looked for, and which should lead to a thorough examination to find the cause when present [12,13]. Iron supplementation, possibly intravenous, should be prescribed if needed, if no source of bleeding is found.

Finally, diuretic treatment, which is generally based on furosemide, should be adapted to the blood volume of the patient. Antialdosterones (now referred to as mineralocorticoid receptor antagonists) should be used with extreme caution in elderly patients and are contraindicated in cases of renal insufficiency [14].

Patient monitoring should allow acute episodes of renal insufficiency to be avoided, notably during extreme weather, such as heat waves where temperatures vary greatly. In effect, patients receiving diuretic treatment lose some of their capacity to adapt their blood volume, and are particularly susceptible to left ventricular preload due to arterial

and ventricular rigidity, and thus are easily susceptible to hypovolemia during a heat wave, with renal insufficiency, hyperkalemia, etc. Conversely, due to the rigidity of the left ventricle, they can also quickly become hypervolemic after the sudden absorption of an excessive quantity of salt. Therapeutic education, which is part of the treatment of all patients with cardiac insufficiency, is particularly important here (and is difficult in elderly patients), in those patients for whom management of blood volume is the main part of their symptom treatment but also their preventive treatment against decompensation. Exercise may also be useful [15].

Patients with cardiac insufficiency with preserved ejection fraction are often elderly, and are unable to benefit from individualized monitoring of B-type or Nt-B-type natriuretic peptide, possibly because the best response to initial decompensation is not the same for all patients and thus cannot be standardized. Monitoring and follow-up are therefore both clinical and biological with repetition of blood electrolyte tests and blood creatinine and urea levels when there is a risk of decompensation.

In conclusion, the therapeutic approach to a patient who presents with cardiac insufficiency with preserved ejection fraction is much more individualized than the standard treatment for patients with cardiac insufficiency and altered ejection fraction. This population is more heterogeneous, the causes for heart failure are different, etc. This is the domain of non-evidence-based medicine, which will always exist!

## Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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